

Stent Apposition: IP

Concepts:

- Stent that grabs wall
 - A stent could be made with barbs or a coating along its outside that attaches it to the vessel wall, thus preventing late mal-apposition
- Magically expanding stent
 - The stent is designed to constantly exert outward radial pressure on the vessel wall, so that the stent naturally prevents mal-apposition by expanding outward to meet the wall
- Apposition detector wand
 - An external metal-detecting apparatus is used to generate an electrical field in the implanted stent; the stent and detector interact to indicate if and when the stent is no longer apposed to the vessel wall

Patents Found:

5704352	6231516	6170488
6092530	2002077661	5800526
6206835	5665103	WO 97/19652
6428570	6179858	WO 02/36045
5387235	4733665	WO 02/00145
6342067	6280385	WO 01/37726

Stent that grabs wall

- o WO 96/12450: Stent Surface Anchor
 - o Applied Vascular Eng Inc
 - o Oct. 19, 1994 / Pending?
 - o An endoprosthesis (10) is provided having an expandable, generally cylindrical body portion defining an inside surface (13) and an outside surface (12). The inside surface (13) is preferably regular and smooth to yield a low coefficient of friction, while the outside surface (12) is modified to yield a relatively high coefficient of friction with a vessel surface. The outside surface includes a macroscopic surface modification (17, 18) to engage the vessel surface, or includes an adhesive coating that bonds the stent to the vessel surface.

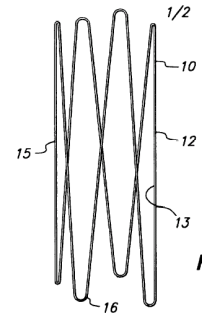
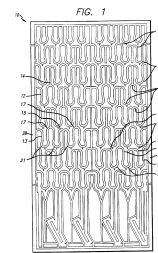


FIG. 1

- o Uses protrusions or a coating that bonds with wall
- o 5800526: Multi-anchor Stent

- o EndoTex Interventional Systems
- o July 24, 1997 / Sept. 1, 1998
- o The intravascular multi-anchor stent includes a plurality of cylindrical elements that are independently expandable in the radial direction and that are interconnected so as to be generally aligned on a common longitudinal axis, and a plurality of barbs along the entire circumference of the stent that face outwardly when the stent is in an expanded condition. A plurality of connecting elements are provided for interconnecting only the cylindrical elements that are adjacent to each other so that the stent, when expanded in the radial direction, retains its overall length without appreciable shortening.
- o Introduces idea of barbs on stent



- o Nothing found about collapsing struts to grab wall as the stent expands
- o Otherwise, this area seems well covered; probably not a good area to work

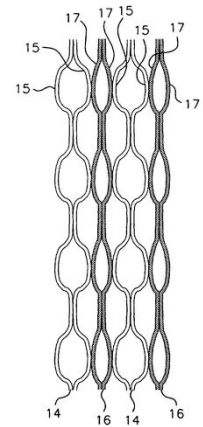
Magically expanding stent

- o WO 02/36045: Combination self-expandable, balloon-expandable endoluminal device

- o SCIMED

- o Oct. 31, 2000 / Pending

- o An endoluminal device, such as a stent or a vena cava filter, comprising at least one superelastic section and at least one plastically deformable section. The superelastic section may comprise, for example, a superelastic grade of nitinol, whereas the plastically deformable section may comprise, for example, gold, platinum, tantalum, titanium, stainless steel, tungsten, a nickel alloy, a cobalt alloy, a titanium alloy, or a combination thereof. Each plastically deformable section may merely comprise a constrained portion of the superelastic section comprising a plastically deformable material, such as gold. The device enables deployment by a method comprising introducing the device into a body lumen with the device radially constrained in a first configuration having a first diameter; allowing the device to self-expand into a second configuration having a second diameter less than or equal to a fully-self-expanded diameter; and then optionally "fine-tuning" the device by forcibly expanding the device into a third configuration having a third diameter in a range between the second diameter and less than or equal to a fully-forcibly-expanded diameter. The superelastic and plastically deformable sections may be tubular sections placed end-to-end, such that the plastically deformable section can be conformed to fit a tapered section of a lumen.



- o part SES / part BES, expandable to two diameters - to combine the advantages of each

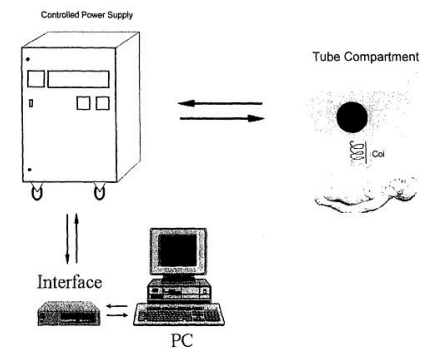
- o No search report

- o WO 02/00145: Method and apparatus for external non-invasive heating of metallic implants by use of alternating magnetic fields

- o Diamantopoulos, Leonidas

- o June 26, 2000 / Pending

- o The described invention is a system that generates alternating magnetic field of appropriate power and frequency, and then direct it to a human body or animal where a metallic implant (stent) or other metal has been previously implanted. The magnetic field power is continuously controlled by a computer with special software. As the magnetizing force changes periodically, the magnetic flux inside the metal lags behind due to its magnetic retentivity. Therefore, to overcome this resistance, energy is spent which appears on the metal as heat. This heat production regards only metals and leave intermediate tissues and non-metallic materials unaffected. In other words, we manage to heat non-invasively implanted metals up to the desired temperature. Heating of such implanted metals, like stents, is possible to reverse restenosis process in stented vessels. In some metals, heating can change their geometry, property which can be useful in Medicine. Finally, the application of the non-invasive heating could prove to be a new method for treating other modalities, like cancer, etc.



- o External field generates heat in stent, heat can be used to change stent geometry

- o Checked search report

- o Most promising area seems to be mechanical stops that release upon application of an external or internal magnetic field

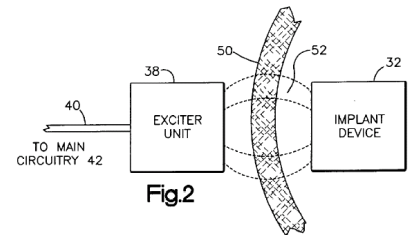
- o no IP found on that

- o might still need some means of diagnosing the problem

Apposition detector wand

- o 6206835: Remotely interrogated diagnostic implant device with electrically passive sensor

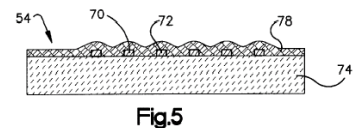
- o BF Goodrich Co.
- o March 24, 1999 / March 27, 2001
- o An implant device is provided which is responsive to an external interrogation circuit. The implant device includes a structure implantable within a living animal and operatively configured to carry out or assist in carrying out a function within the living animal. The device further includes an electrically passive sensing circuit integral with the structure for sensing a parameter associated with the function. In particular, the sensing circuit includes an inductive element wherein the sensing circuit has a frequency dependent variable impedance loading effect on the interrogation circuit in response to an interrogation signal provided by the exciter/interrogator element, the impedance loading effect varying in relation to the sensed parameter.



- o impedance changes due to sensed parameter
- o no mention of apposition specifically
- o might be able to get around it
- o several BF Goodrich patents in this area

- o 6092530: Remotely interrogated implant device with sensor for detecting accretion of biological material

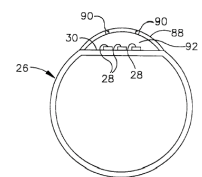
- o BF Goodrich Co.
- o March 24, 1999 / July 25, 2000
- o An implant device which includes a structure implantable within a living animal and a sensor included as part of the structure. The sensor is operatively configured to detect accretion of biological material on the sensor by producing an output which varies as a function of the accretion of biological material on the sensor. A communication element is further included as part of the structure and is operatively coupled to the output of the sensor. The communication element is configured to communicate information based on the output of the sensor wirelessly to a remote element located outside the living animal.



- o sensor on stent to detect restenosis ('accretion of biological material')
- o SAW/MEMS device
- o doesn't read as long as our device doesn't detect accretion

- o WO 01/37726: Remotely interrogated medical implant with sensor

- o BF Goodrich Co.
- o Nov. 23, 1999 / Pending? Abandoned?
- o A medical implant device is provided which includes a structure implantable within a body of a living animal for assisting in carrying out a function within the body. The device further includes a transducer element mounted on a carrier for sensing a parameter associated with the structure. Moreover, the device includes a communication circuit coupled to the transducer element for producing an output based on the sensed parameter and which serves to communicate the output non-invasively to a receiver located outside the body. The carrier is bonded to the structure such that portion of the structure located immediately beneath the carrier is isolated from stresses generated in regions of the structure not under the carrier.



- o More general, still doesn't address apposition directly

- o Metal detector patents

- o Lots of general IP about implantable sensors
 - o Nothing specific to late malapposition